Administrative and Operational Support Airlift Commonality Study

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AFISA

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At the request of a Support Airlift General Officer Steering Group chaired by AF/RDQ, a commonality study among five administrative and operational support airlift programs was conducted. Each program is projected to acquire commercial off-the-shelf aircraft beginning in the mid to late 1980's. These programs are: (i) European Distribution System Aircraft (EDSA); (ii) Tanker-Transport-Bomber (TTB) trainer for ATC; (iii) Special Air Mission (SAM) aircraft to replace the C-140; (iv) Replacement or modernization of the Operational Support Airlift (OSA) CT-39 fleet and; (v) Replacement Flight Check (FC) aircraft. While the airframe requirements for each of these programs are different, there is enough similarity that the potential for airframe commonality appears to exist. Also, each program is planning on a contractor logistics support (CLS) maintenance concept. This study investigated both the benefits and impacts of airframe commonality for these programs.

Airframe requirements were used to develop a list of candidate aircraft for each mission area. Using this list and cost data supplied by AF/ACMC, each program was considered separately and the aircraft with the lowest 20-year life-cycle cost was chosen. This mix of airframes is shown in Table 1 and provided a baseline case.

MISSION	SAM (C-140)	FLIGHT CHECK	EDSA	TTB	OSA LONG RANGE	OSA SHORT RANGE	TOTAL
NUMBER AIRCRAFT	11	7	18	225	130	82	473
AIRCRAFT CHOSEN	GULFSTREAM III	WESTWIND II	AHRENS 404	DIAMOND I	LEAR 35A	BEECH 200	
20 YEAR LCC (FY 82 $M)	545.31	161.11	387.41	4020.85	2262.49	1203.09	8580.26

Table 1. Individual Aircraft Buys.

Key observations are: (i) although there is no one aircraft that can satisfy all mission areas, there are a number of aircraft that can satisfy more than one mission area; (ii) of the nine commonality options developed, the total cost for seven of them fell within the ± 7% estimating error of the baseline case; (iii) the two options outside this seven percent range provide the greatest degree of commonality but are higher in cost because they include a large percentage of relatively expensive aircraft; (iv) even when some requirements are modified to achieve greater airframe commonality, the total life-cycle cost remains essentially the same; (v) in order to take advantage of any possible commonality benefits, coordinated request for proposals (RFPs), or possibly a joint RFP, for these different programs would seem appropriate; (vi) the benefit or impact of commonality could be significantly altered by how any particular manufacturer responds to a RFP.

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Discussion

The analysis looked at schedule compatiblity to determine if the procurement schedules would accommodate blending two or more programs together. The schedules and number of aircraft involved are such that the airframe acquisitions could easily be combined, if desired.

Table 2 shows the airframe requirements that were used in this study for each mission area.

	RANGE (NM)	PAYLOAD	SPEED	RUNWAY (FT)
EDSA	700	F-100 ENGINE (4200 LBS)	140 KTS	2000 T. O. & LANDING
OSA SHORT RANGE	500 - 700	8 - 10 PAX 1800 - 2000 LBS	240 KTAS	3000 T. O. & LANDING
OSA LONG RANGE	1500 - 2000	6 - 8 PAX 1800 - 2000 LBS	.7M	5000 T. O. & LANDING
TTB	1500	----	.75M CRUISE 300 KTAS @ 500 FEET	----
AFCC FLIGHT CHECK	2400	6 PAX	.8M	5000 T.O. 4500 LANDING
SAM MEDIUM RANGE	1800	14 - 18 PAX	.8M	5000 T.O. 4500 LANDING
SAM LONG RANGE	2200	14 - 18 PAX	.8M	5000 T.O. 4500 LANDING

Table 2. Desired Airframe Characteristics.

Table 3 is a representative range of commonality options that were examined based on the desired airframe characteristics in Table 2 and the capabilities of the individual aircraft.

OPTION I 373 G-III (SAM, FC, TTB, OSA)
100 AHRENS (EDSA, OSA)

OPTION II 11 G-III (SAM)
362 WESTWIND II (FC, TTB, OSA)
100 AHRENS (EDSA, OSA)

OPTION III 11 G-III (SAM)
7 WESTWIND II (FC)
355 LEAR 35A (TTB, OSA)
100 AHRENS (EDSA, OSA)

OPTION IV 11 G-III (SAM)
7 WESTWIND II (FC)
225 DIAMOND I (TTB)
130 LEAR 35A (OSA)
100 AHRENS (EDSA, OSA)

Table 3. Commonality Options (With Stated Requirements).

Excursions considered the effect of modifying the constraining airframe requirement in each mission area. The changes made are shown in Table 4 with the resulting aircraft mixes in Table 5. In all cases, except options I and II in Table 3, the 20-year life-cycle costs are well within $\pm$ 7% of the individual aircraft option shown in Table 1. Seven percent is the approximate range within which it is not possible to say there is any statistically significant difference in cost.

MISSION	CHANGE IN REQUIREMENT	IMPLICATION	OPTIONS
EDSA	DELETE F-100 ENGINE DECREASE PAYLOAD	SAME AS SHORT RANGE OSA	V, VI, VIII
FLIGHT CHECK	DECREASE RANGE TO 2000 NM	SAME AS LONG RANGE OSA	VI, VII, VIII, IX
TTB	DECREASE AIRSPEED TO 260 KTS	CITATION II IS CANDIDATE	VII, VIII
OSA SHORT RANGE	MINIMUM RUNWAY 4000 FT	DIAMOND I IS CANDIDATE	IX

Table 4. Requirements Modification.

OPTION V	11 G-III (SAM)	OPTION VII	11 G-III (SAM)	OPTION IX	11 G-III (SAM)
	7 WW II (FC)		137 LEAR 35 (FC, OSA)		137 LEAR 35 (FC, OSA)
	130 LEAR 35 (OSA)		307 CITATION II (OSA, TTB)		307 DIAMOND I (TTB, OSA)
	225 DIAMOND I (TTB)		18 AHRENS 404 (EDSA)		18 AHRENS 404 (EDSA)
	100 BEECH 200 (EDSA, OSA)				
OPTION VI	11 G-III (SAM)	OPTION VIII	11 G-III (SAM)		
	137 LEAR 35 (FC, OSA)		137 LEAR 35 (FC, OSA)		
	225 DIAMOND I (TTB)		325 CITATION II (OSA, TTB, EDSA)		
	100 BEECH 200 (EDSA, OSA)				

Table 5. Commonality Options (Modified Requirements).

The costs for the various options show little effect from commonality because a major portion of the 20-year life-cycle costs are not affected by commonality. Operating and support costs, composed primarily of manpower, POL, and CLS costs, are approximately 87 percent of the life-cycle cost. While the POL cost varies from aircraft type to aircraft type, it is not affected by commonality. The manpower and CLS costs are slightly affected by commonality but not enough to make a significant impact on the life-cycle cost.

There are several factors that could possibly influence a commonality decision that were not analyzed in detail. The possibilty of decreased training costs, altered management costs, increased flexibility with two programs using the same aircraft type, and the value of an airframe with growth potential were not treated analytically. The effect of complete Air Force maintenance instead of limited Air Force flight line maintenance and the rest covered by a CLS contract was not analyzed. While any of these factors may have an impact, the best estimates are that the effect on cost is in the range of 2% - 3%--well within the 7% uncertainity range of the overall cost estimations.

A more likely influencing factor is the offer any particular manufacturer might make. Discussions with several companies indicate that, especially under current market conditions, the brochure prices used as the basis for the cost data could be expected to vary significantly in a formal proposal. These variations could easily overshadow the other cost considerations but cannot reasonably be estimated until formal responses to RFPs are received.